
Bernard Sadoulet

Dept. of Physics /LBNL UC Berkeley
UC Institute for Nuclear and Particle
Astrophysics and Cosmology (INPAC)

Conclusions

What has happened this week?

What has not happened?

What next?

What has happened this week?

Earth Science/geo-engineering/Physics

Exciting Scientific Opportunities

Powerful case for DUSEL

Clear demonstration of unity

Coordination with other national/international
initiatives

Convergence on methodology

Importance of education and outreach

Physics/Earth Science

Clearly something is happening

Partnership

Not only to boost political case

Money saving/new opportunities from co-location

e.g. Deep module as platform

Instrumentation of the site before construction and monitoring after

biological precautions

Synergies

Technology MEMS, Data acquisition

Large caverns

Novel scientific methods

use of particle methods for earth exploration (neutrinos,
low rein)

use of geophysics methods for particle detection?

Different styles

novel approaches

more effective argumentation with agencies

Intellectual climate at site(s)

Multidisciplinary=> intellectual creativity
education of our students
education and outreach

The Big Scientific Question

Illuminating the dark side of the earth and the cosmos

Nature of dark matter and dark energy

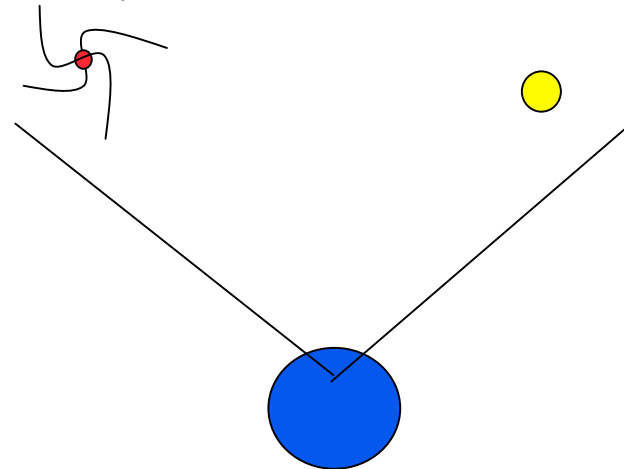
The neutrino properties

Matter/antimatter asymmetry and stability of matter

Ancient life/evolution/adaptation

Understanding the earth and its evolution /rock deformation/
earthquakes

Imaging the underground world => mastery of the rock



A Powerful Case for DUSEL

Unique aspects

Earth Science: Deep, long term is unique

Physics: Depth ?

Long base line + accelerators

Likely demand and evolution of science

We have to build the case

Ropad maps + Infrastructure requirements

Strategic importance

- as large scale experiments become international , important to have US site to have US teams leading the projects
- We want the U.S. to be a leader in geoscience techniques
 - Energy sciences (finding oil deposit, etc.)
 - Underground construction
- Education of our scientists and engineers
- Homeland security

International context and partnerships

SNO

Japan/Europe

Coordination with other initiatives

Established

Earth scope
Deep sea drilling

Projected

Proton driver and super neutrino beam (Brookhaven/Fermilab)

Multi purpose large detector

Secure earth (LBNL, ORNL)

Ultra-low Radioactive Counting (PNL....)

In addition to the "site consultation group"

we propose an "Initiative Coordination Group" which
includes national labs and large institutional partners

coordination with initiatives (non destructive
interference, synergies)

involvement of agencies

in most cases will meet together but site consultation group
may meet by itself to deal with relation between S1 and S2

Convergence on Methodology

Roadmaps

Infrastructure requirement matrices

Slightly different for earth science and physics

As specific as we can on first suite of experiments

Should include scale in number of people and cost estimation

Need specification

Need forms/ questionnaire to be filled (Working group)

=> Modules built

Evaluate demand and sketch evolution

in a realistic way (renormalization)

Site independence

Focus on generic

beware of committee engineering

Alternate self consistent scenarios to handle

Fully use already existing materials

+ accumulate new material on web site

What has not happened yet?

Prioritization/road maps in earth science

Involvement of main stream biology

More direct involvement of industry

some site dependence

Involvement of minority serving institutions as
partners

site-dependence

Earth Science/ Physics

Bringing more Earth Science/Engineering /Biology together

Workshop very soon ?

Occasion for other actors (industry)

Continue to bridge intellectually between the two communities

Trigger a series of cross disciplinary colloquia at our institutions
geoscientists /biologists in physics departments and vice versa

Cross disciplinary Graduate Seminars (Joe Wang). Can we
experiment with teleconferencing? (but resource/time problem)

Physics/Earth Science

Clarity about differences

Earth scientists: heterogeneous fragmented

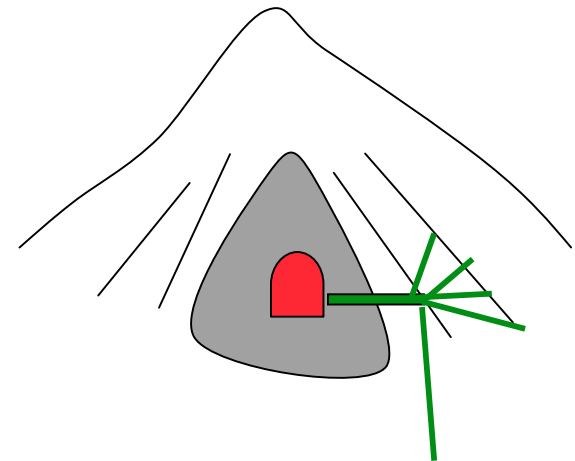
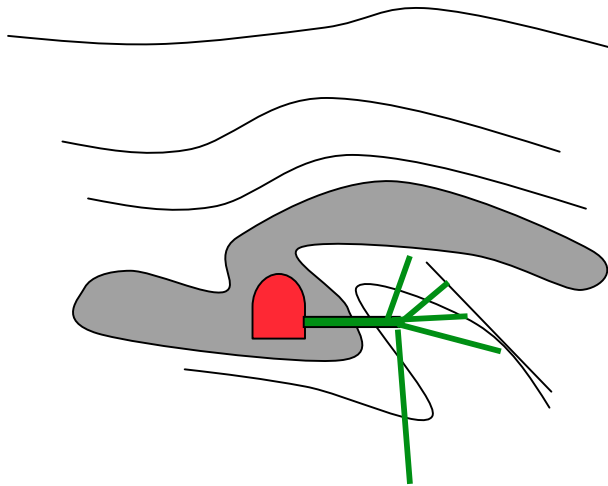
Physicists: homogeneous => large cavities

Earth scientists: more sites

Physicists: single organization

Earth scientists: virgin territory

Some physicists: use of existing sites
to reduce costs



Time Table

Sept 15 Proposal

15-25 pages

Working group three quarter of page August 20

Scientific case/road map, Open questions, focus of the study

Continuing work on infrastructure in order to have impact on solicitations

Infrastructure requirement matrix: October <==Has not worked well in past

Official approval Dec 1? Proceed in any case

Proposed workshops

Denver Jan 05

Further integration of Earth Sciences and Physics
Modules

Washington DC Mar 05

Conclusions
Participation of agencies

Final report \approx 50 pages + web

External review (NRC style)

A Call for Simplicity

Simplicity of the message

The big scientific questions:

"Illuminating the dark side of the earth and the universe"

The scientific activities: The underground frontier

The most sensitive detectors searching for the most feeble signals from matter and the universe

The deepest observatory of the earth crust and of the dark life it contains

The most flexible "sand box" to gain mastery of the rock

The impact on society

The training of the next generations of scientists and engineers

The strategic importance of a US DUSEL

The international partnership

Simplicity of the benchmarks and recommendations

A site or set of sites with unique characteristics

Flexibility/evolution/expansion

Multidisciplinary

Need for R&D and prototyping (pre-DUSEL, at DUSEL)

Control by the scientists - unrestricted access by non-nationals

NSF leadership, multiple agency involvement

Single site or multi-site under same management umbrella

Education and outreach included from the start

Partnership with local community /institutions (+ minority serving schools)

International coordination

A Call for Simplicity

Do not overload the boat!

Too complex a study will bog it down

We all have busy lives!

Use existing materials + put at disposal of communities

Too many requirements for DUSEL would make the project too expensive

Modules, phased development, initial suite of experiment

Single site or multiple sites if this is cheaper / faster

Multidisciplinary aspects should enhance, not weigh down the project

Synergies

Clarity about incompatibilities, creativity to deal with them

Too complex institutional schemes will take for ever

Partnership with NSF

We are not in the game of guessing what NSF means

Our goal: Developing with NSF the right concepts for the field

Thanks

Staff

Caryl Esteves, Jeanne Miller, Mary MacCready, Karen Edwards
Elizabeth Arscott
Rosemary Nocerra
Kyle Sundqvist, Jeff Filippini, Miguel Daal, Tom and Melissa Campbell

Berkeley Scientists

Reyco Henning, Al Lu
Joe Wang, Kevin Lesco

INPAC colleagues

Sites

Thank you for behaving!

University of California and National Laboratories

All the colleagues that have contributed in building
the case for DUSEL

Al Mann, John Bahcall, Wick Haxton